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## (54) Method for the replacement of the roof portion of a refrigerated container.

(57) Method for the replacement of the roof portion of a thermally insulated refrigerated container 1 by placing sandwich panels 2, 2′ on the bearing edge 3. The peripheral space around the sandwich panels 2, 2′ is then foam-filled. Metal cover plates 8 are subsequently placed over the sandwich panels 2, 2′ and the foam-filled spaces. These are fastened to the walls, for example by welding. The cover plates 8 can grip into one another by means of folded edges 11. The invention can be applied by untrained personnel in remote places with the use of simple equipment.

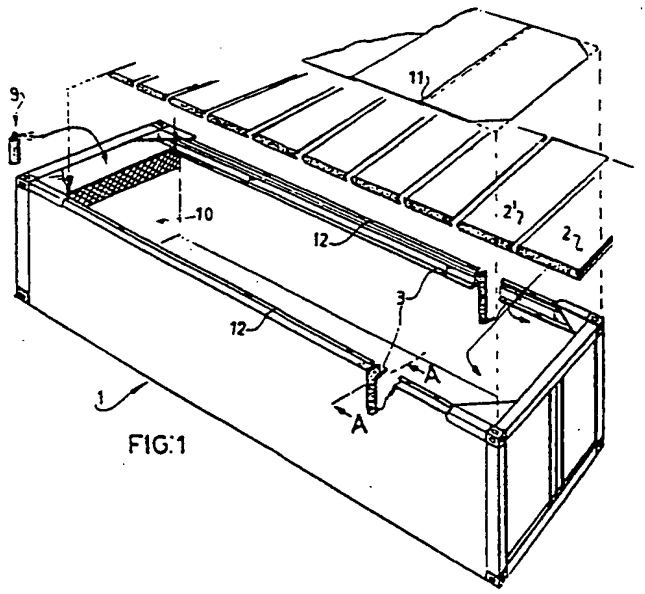


FIG.1

EP 0 321 009 A1

# Method for the replacement of the roof portion of a refrigerated container

The invention relates to a method as described in the heading of claim 1.

Such refrigerated containers circulate in large numbers around the entire world. In practice it has been found that the roofs of such refrigerated containers are in need of replacement after a certain time. For many unknown reasons, the roof portion develops leakages after a period, so that the refrigerated container concerned is no longer fit for use. The replacement of the roof portion is not in itself a difficult problem. However, trained personnel and to some extent special equipment are needed for the replacement of the roof with a new one. These facilities are however available in only a few places. Since the containers to be repaired are widely spread around the world, it is not economic to transport the containers to a central point for repair.

The invention has for its object to produce a method for the replacement of the roof portion of a refrigerated container which can be carried out by personnel with limited or no training, with the use of simple equipment.

This is achieved by adopting the steps described in the characterizing part of claim 1.

By constructing the replacement roof portion from relatively small elements which can be handled without special equipment, the method according to the invention can be applied practically anywhere. To carry out the repair, operations which demand trained labour are not essential. The mounting of the sandwich panels, the foam-filling of the empty spaces and the arranging of metal cover plates over the sandwich panels can be performed by untrained personnel. Neither does the fixing of the cover plates in relation to the walls of the container require any great degree of manual skill. The cover plates can, for example, be welded in position on the walls of the container. A simple welded joint is adequate for this purpose. Preferably, the sandwich panels are fixed with respect to the bearing edge by means of pop rivets. The sandwich panels can mate together by means of a tongue and groove joint.

It is also possible to glue the sandwich panels firmly to the cover plates. The joint between adjacent metal cover plates can be brought about by the use of edge folds which grip into one another.

The invention also relates to a kit for use in the replacement of the roof portion of a refrigerated container, where the refrigerated container has the standard dimensions 12 x 2.38 x 2.38 metres, and the kit consists of ten sandwich panels each measuring 2. 20 x 1.20 x 0.08 metres, together with six galvanized steel cover plates, pre-pressed polyurethane tape and polyurethane foam sealing material. A kit of this kind can easily be transported to anywhere in the world, where it can be used for replacing the roof portion of a refrigerated container with the aid of extremely simple hand tools and a set of welding equipment.

In the drawings:

figure 1 shows a perspective view of a container according to the invention;

figure 2 shows a sectional view as indicated by the arrows A-A in figure 1; and

figure 3 shows a perspective view of the kit for use in the method according to the invention.

The freight container 1 has a top wall which, like the other walls, is of insulating material. When according to the invention the roof portion has to be replaced, a number of sandwich panels 2, 2' are laid on the encompassing bearing edge 3. The sandwich panels grip together by means of a tongue 4 and groove 5. The sandwich panels are fastened all around to the bearing edge 3 by means of a pop rivet 6. The peripheral end spaces 7 are foam-filled. Then the cover plates 8 are placed over the sandwich panels and fastened to them using adhesive. For a container with the usual dimensions, ten sandwich panels and eight cover plates are required. The cover plates 8 grip together by means of folded edges 11. A portion is left uncovered at the end adjacent to the refrigeration unit 10. This portion is foam-filled with PU-foam 9 using a spray canister. Finally, the plates 8 are fastened all around by welding to the upright walls of the container, or at least to the angle section 12 arranged on those walls. In this manner a new container roof of the same quality as the original one-piece roof portion is obtained with the use of very simple means.

Figure 3 shows the kit for the repair of a standard container. The kit comprises ten sandwich panels 2, eight steel cover plates 8, polyurethane tape 13, foam material 14 and a holder 15 for small items, such as pop rivets.

## Claims

1. Method for the replacement of the roof portion of a freight container, in particular a thermally insulated refrigerated container, on the inside of which is arranged an encompassing bearing edge supporting the roof portion, and of which the insulation layer is formed by a "sandwich" construction, **characterized in that**, after removal of the roof portion, sandwich panels are placed close-fitting on

the bearing edge, the peripheral space around the sandwich panels is foam-filled, and metal cover plates are subsequently placed over the sandwich panels and the foam-filled spaces and these plates are fastened to the walls of the container.

2. Method as claimed in claim 1, **characterized in that** the sandwich panels are fixed with respect to the bearing edge using fastening means.

3. Method as claimed in claims 1-2,**characterized in that** the sandwich panels are joined to one another by use of a tongue and groove joint.

4. Method as claimed in claims 1-3, **characterized in that** the cover plates are welded in position to the walls of the container.

5. Method as claimed in claims 1-4, **characterized in that** the sandwich panels are sealed with respect to the foam in the peripheral space with polyurethane tape.

6. Method as claimed in claims 1-5, **characterized in that** the sandwich panels are glued firmly to the cover plates.

7. Method as claimed in claims 1-6, **characterized in that** the metal cover plates grip into one another by means of folded edges.

8. Method as claimed in claim 7, **characterized in that** the folded edges are sealed off by a spraying operation.

9. Kit for use in the replacement of the roof portion of a refrigerated container with the standard dimensions of 12 x 2.38 x 2.38 metres, consisting of ten sandwich panels each measuring 2.20 x 1.20 x 0.08 metres, and eight galvanized steel cover plates, pre-pressed polyurethane tape and polyurethane foam sealing material.

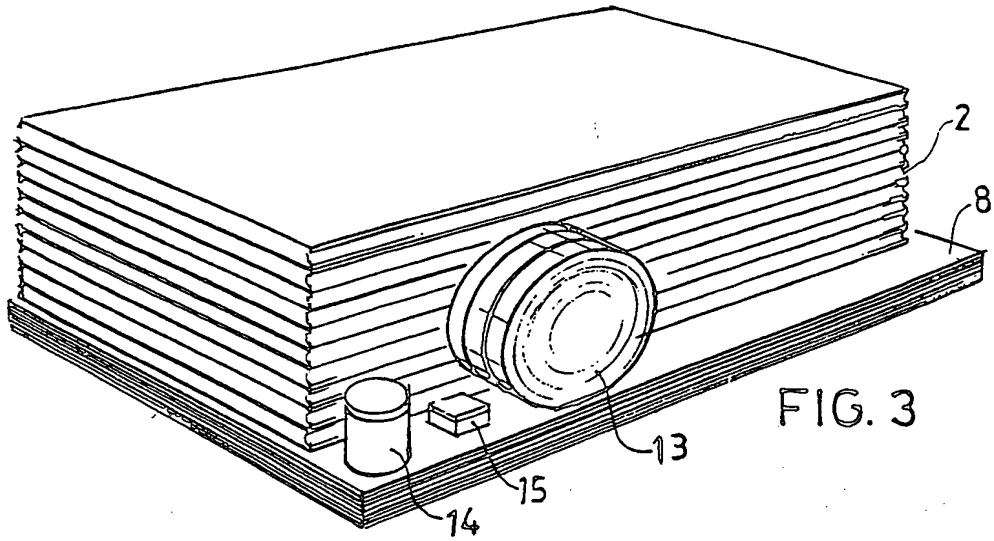


FIG. 3

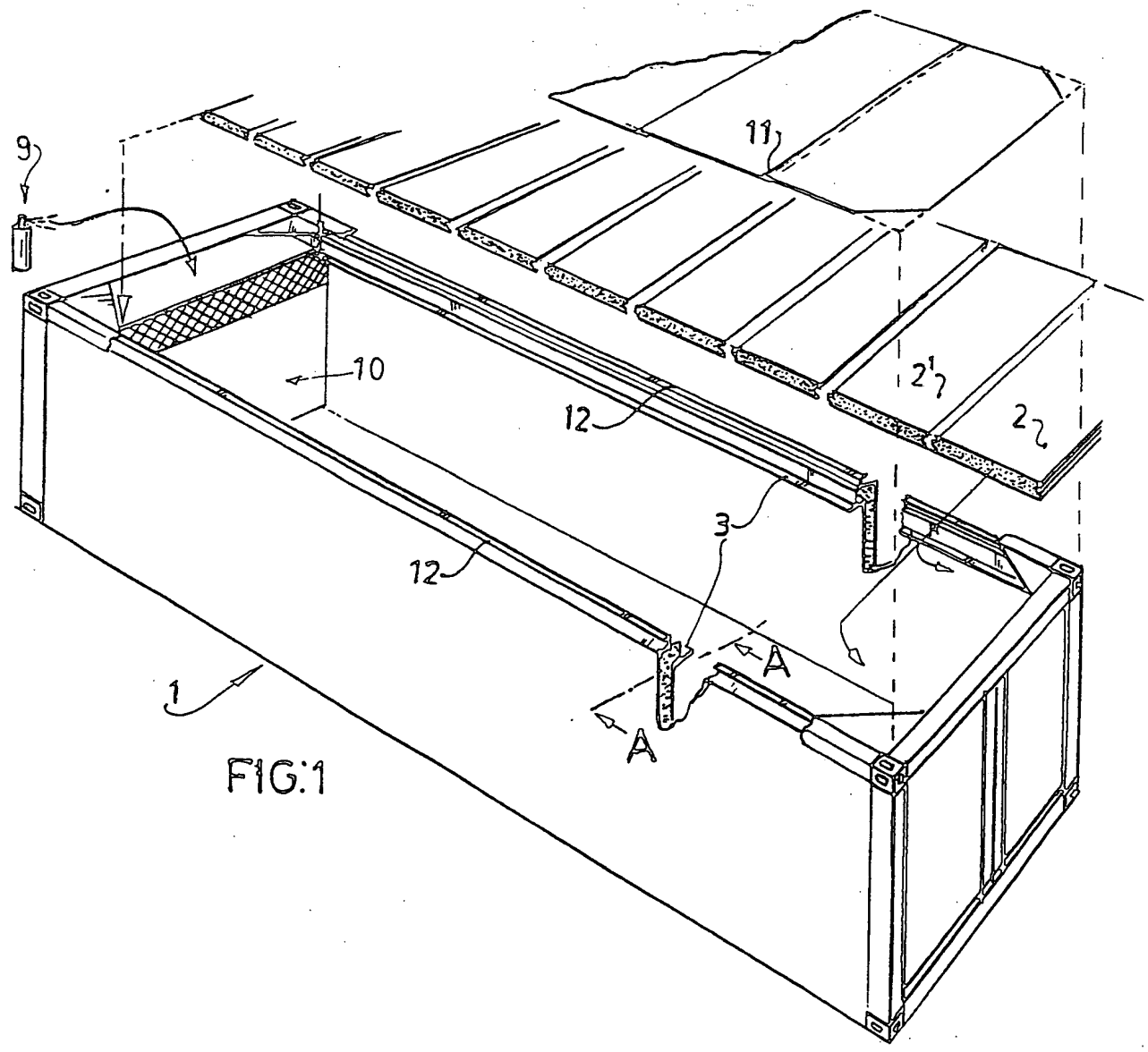


FIG.1

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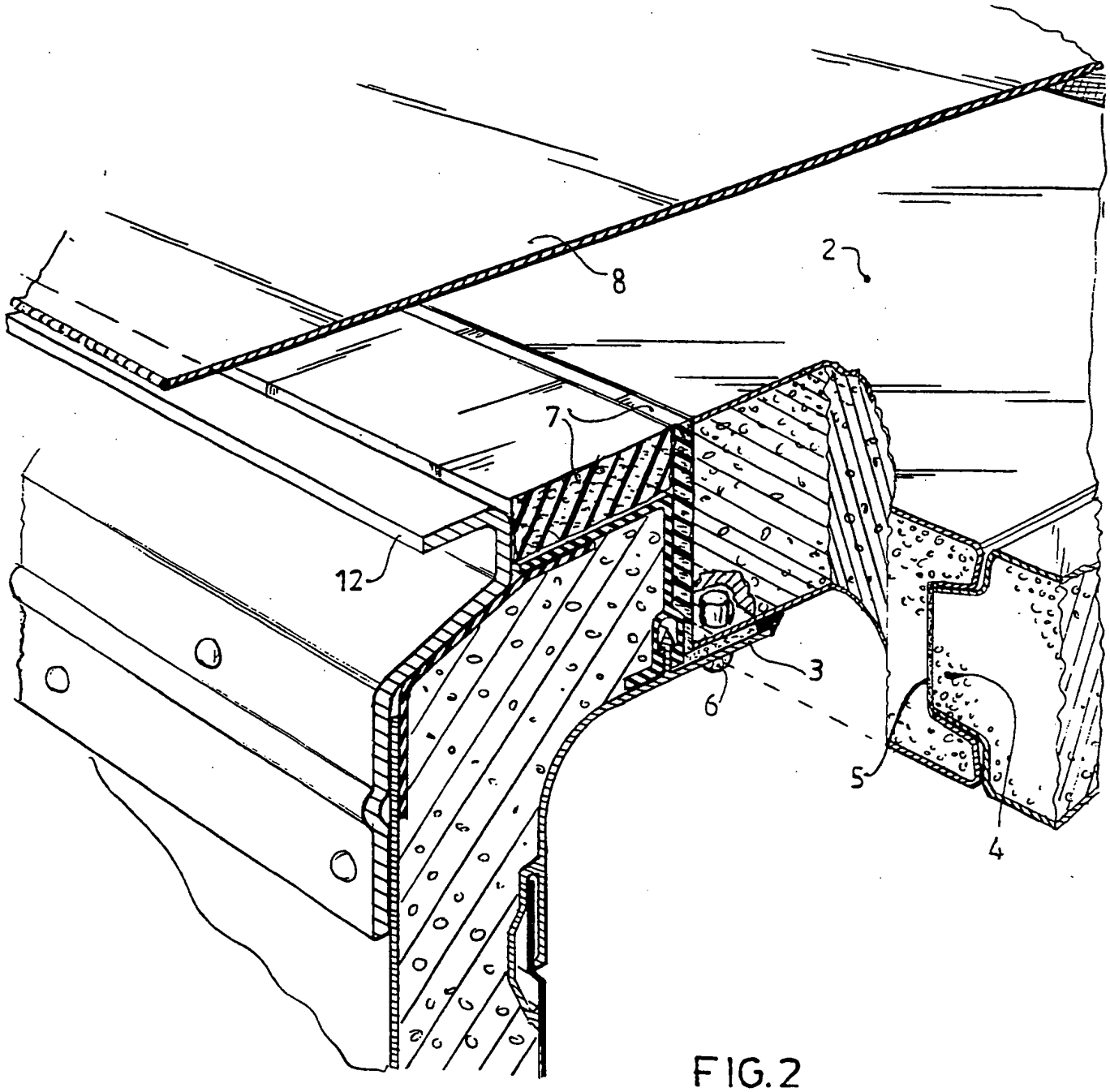


FIG.2

European Patent Office

# EUROPEAN SEARCH REPORT

Application Number

EP 88 20 2677

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int. Cl.4) |
|---|---|---|---|
| X | DE-A-1 906 143 (DEUTSCHE WAGGON- UND MASCHINENFABRIKEN GmbH)<br>* Whole document * | 1-3 | B 65 D 90/06 |
| Y<br>A | | 4,6,7<br>9 | |
| Y | DE-A-2 705 505 (VKI)<br>* Figures 1,2; page 8, lines 1-13 * | 4,6,7 | |
| A | | 1-3 | |
| A | CH-A- 504 660 (E. FLÜCKIGER)<br>* Whole document * | 1-3,9 | |

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

B 65 D

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| THE HAGUE | 08-03-1989 | WERNER D.M. |

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